

Date: Thursday, 25/09/2008 8:25:45 AM  
 User: Melanie Fauteux

## Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: HIGH AFT X-TUBE 412
Job Number	: 42278		
Estimate Number	: 13210		
P.O. Number	:	Part Number	: D412664203TRN
This Issue	: 25/09/2008 S.O. No. :	Drawing Number	: D412-664-243 REV D
Prsht Rev.	: NC	Project Number	: N/A
First Issue	: 11 Type : CROSSTUBES	Drawing Revision	: D
Previous Run	: 42277	Material	:
Written By	:	Due Date	: 02/10/2008 Qty: 1 Um: Each
Checked & Approved By	: <u>MF 08-09-25</u>		
Comment	: Est Rev:A 08-03-06 new issue DD verified by:eec Est Rev B 08.04.02 Removed polish EC verified by: DD		

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0	D6009129	Crosstube Material
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Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6009-129 Crosstube 632306

Check OD = 3.500"; ID = 2.250"

Q.M 08.09.25

2.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
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Comment: MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand &amp; install plugs DT8534 on both ends as per Folio FA166

2-Turn first side as per Folio FA166

3- File transition lines smooth.

Q.M 08.09.25

3.0	QC1	INSPECT ALL DIM TO DIM SHEET
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Comment: INSPECT ALL DIM TO DIM SHEET

Q.M 08.09.25

4.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
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Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA166

2- File transition lines smooth.

Q.M 08.09.25

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Date: Thursday, 25/09/2008 8:25:45 AM  
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 42278

Part Number: D412664203TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

3- Remove sand and plugs

4-Scribe part # and batch # using vibrating stylus as per Dwg D412-664-243  
engrave on outside of tube)

Inside of Cuff(Donot

*am 08.09.250*

5.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

*am 08.09.250*

6.0

QC8

SECOND CHECK



Comment: SECOND CHECK

*AWM 8-9-26*

7.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

*AWM 8-9-29*

8.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

*RT 08-09-29*

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and stock in kanban rack

Location: *X-TUBE CEC*

*AWM 8-9-29*

10.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

*08/10/02 RJ*

Job Completion



*MF 08-09-30*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**DART****RELEASE**

07.04.24

DESIGN <b>PH</b>	DRAWN BY <b>PH</b>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <b>QP</b>	APPROVED <b>[Signature]</b>	DRAWING NO. D412-664-243	REV. D SHEET 1 OF 3
DATE 07.03.09		TITLE CROSSTUBE ASSEMBLY (412 HI AFT)	SCALE NTS
A	01.10.17	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
C	06.10.27	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398 MS21920-32 WAS MS21920-30	
D	07.03.09	REMOVE D2732-058, CHANGE TO D3595-063-570	

Qty	Part Number	Description
X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
1	D6009-129	CROSSTUBE
2	D3595-063-570	RUBBER CUSHION
1	D2896-1	SUPPORT
2	D2856-600-1009	ABRASION STRIP
4	MS21920-28	CLAMP
2	MS21920-30	CLAMP (OR MS21920-32)
2	D3189-1	CHAFING SHIELD
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

**GENERAL NOTES:**

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129  
FINISHED LENGTH = 124.09±0.020
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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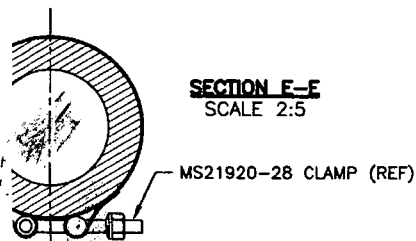
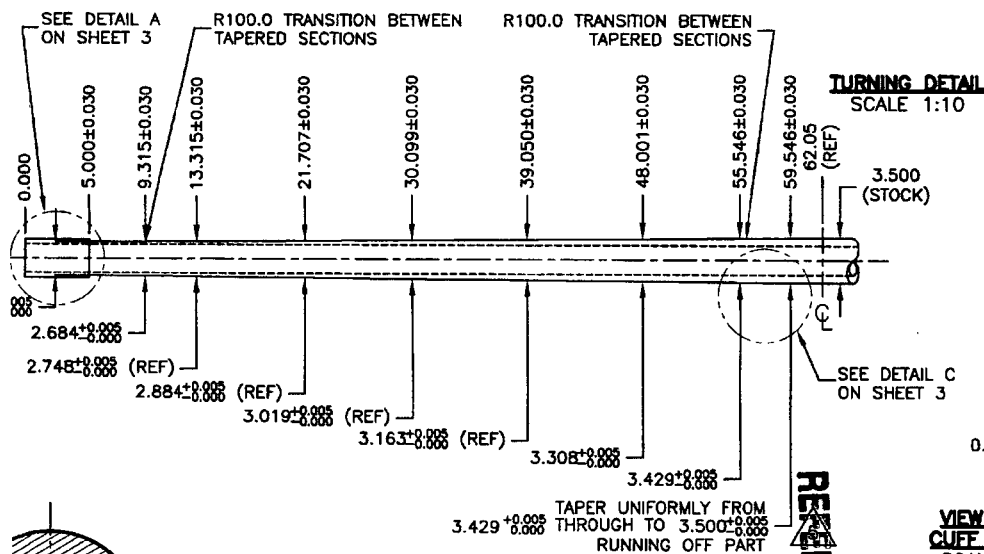
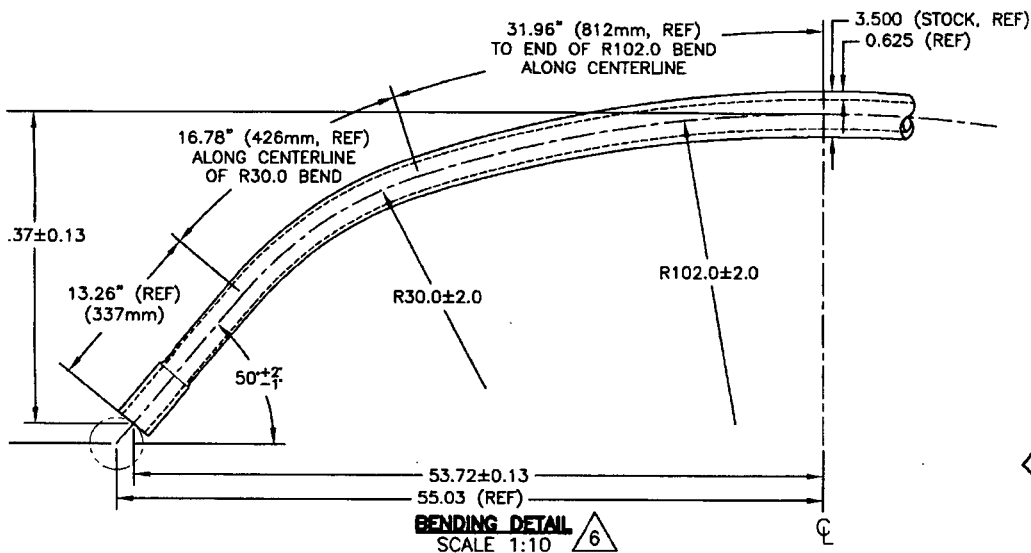
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

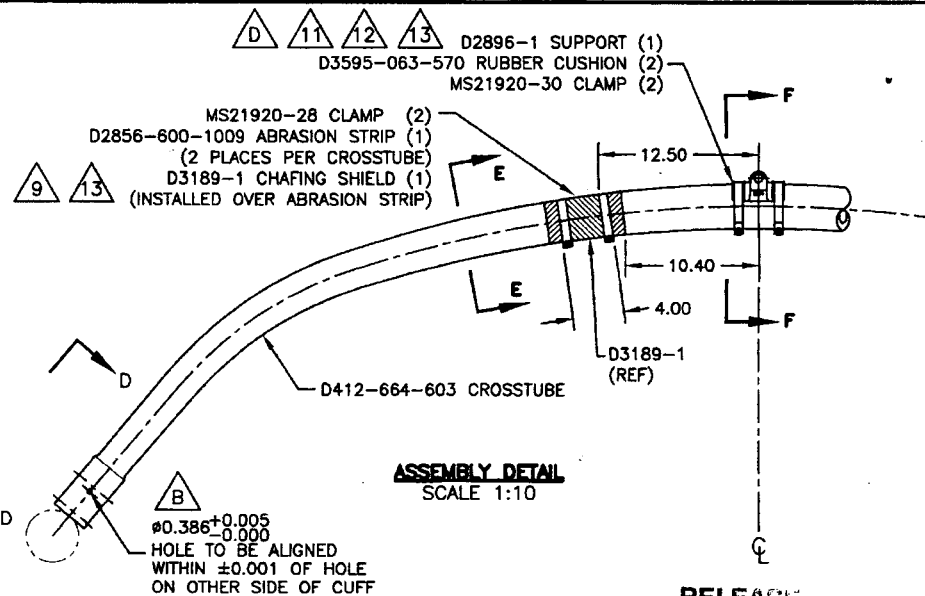
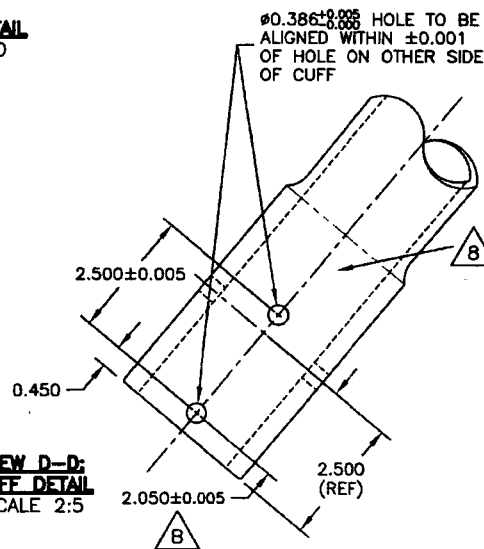
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**NOTE:** Date & initial all entries



REFERENCE ONLY

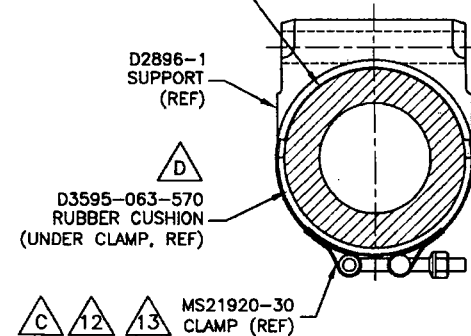
**VIEW D-D:  
CUFF DETAIL**  
SCALE 2:5



RELEASE

07.04.24

**SECTION F-F**  
SCALE 2:5



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DESIGN	PH	DRAWN BY	PH	<b>DART</b>	DART AEROSPACE LTD. HARRISBURG, ONTARIO, CANADA
CHECKED	9P	APPROVED	PH	DRAWING NO.	D412-664-243
DATE	07.03.09	TITLE	CROSSTUBE ASSEMBLY (412 HI AFT)	SHEET 2 OF 3	SCALE 1:10

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries



07.04.246  
PER ECN 88

**DETAIL A: CROSSTUBE CUFF**

0.000

2.990<sup>+0.005</sup><sub>-0.000</sub>

4.971 ± 0.030

5.393 ± 0.030

0.200

30° X 0.500 DEEP CHAMFER

5

R0.063

2.618 (REF)

5.000 (REF)

SEE DETAIL B

SEE DETAIL B

**DETAIL B: CUFF  
TRANSITION**  
SCALE: 4:1

**REFERENCE ONLY**

**DETAIL C:**  
**TAPER RUN-OFF**  
**NOT TO SCALE**

R100.0  
(REF)

5 RUN OFF PART

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DESIGN

PH

DRAWN BY

87

**DART**

**DART AEROSPACE LTD.**  
HAMPSHIRE, ONTARIO, CANADA

CHECKED

APPROVED

	DRAWING NO.
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D412-664-243

REV. D

DATE \_\_\_\_\_

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CROSSTUBE ASSEMBLY (412 HI AFT)

354

1:f

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>	<b>Work Order:</b>	42278
<b>Description:</b> Crosstube Assembly (412 High Aft)	<b>Part Number:</b>	D412-664-243
<b>Inspection Dwg:</b> D412-664-243 Rev: D		Page 1 of 1

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.684	+0.005/-0.000	2.689	/			
	2.748	+0.005/-0.000	2.753	/			
	2.884	+0.005/-0.000	2.889	/			
	3.019	+0.005/-0.000	3.021	/			
	3.163	+0.005/-0.000	3.163	/			
	3.308	+0.005/-0.000	3.313	/			
	3.429	+0.005/-0.000	3.434	/			
	2.990	+0.005/-0.000	2.990	/			
	2.618	+0.005/-0.000	2.618	/			
	0.200	+/-0.010	0.200	/			
	R0.063	+/-0.010	R0.063	/			
	R0.500	+/-0.010	R0.500	/			
	4.971	+/-0.030	4.971	/			
SIDE B	2.684	+0.005/-0.000	2.689	/			
	2.748	+0.005/-0.000	2.753	/			
	2.884	+0.005/-0.000	2.889	/			
	3.019	+0.005/-0.000	3.021	/			
	3.163	+0.005/-0.000	3.163	/			
	3.308	+0.005/-0.000	3.313	/			
	3.429	+0.005/-0.000	3.434	/			
	2.990	+0.005/-0.000	2.990	/			
	2.618	+0.005/-0.000	2.618	/			
	0.200	+/-0.010	0.200	/			
	R0.063	+/-0.010	R0.063	/			
	R0.500	+/-0.010	R0.500	/			
	4.971	+/-0.030	4.971	/			
	124.09	+/-0.020	124.090	/			

<b>Measured by:</b>	a.m	<b>Audited by:</b>	AWM	<b>Prototype Approval:</b>	N/A
<b>Date:</b>	08.09.25	<b>Date:</b>	8.9.25	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	07.05.08	Tolerance updated for dimension 4.971	KJ/JLM	

**Dart Aerospace Ltd**

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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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